

## WHAT IS CLAIMED IS:

- 1 1. An add multiplexer having an input port and an output port, comprising:  
2  
3 an optical circulator comprising a first port, a second port, and a third port,  
4 said first port of said optical circulator coupled to the input port of the add  
5 multiplexer;  
6  
7 an optical monitor mechanism coupled to said third port of said optical  
8 circulator,  
9 a wavelength add mechanism coupled to said second port of said optical  
10 circulator; and  
11  
12 said wavelength add mechanism being coupled to the output port of the  
13 add multiplexer.
- 1 2. An add multiplexer of claim 1, wherein said optical monitor measures  
2 optical power at said third port of said optical circulator.
- 1 3. An add multiplexer of claim 1, wherein said optical monitor measures the  
2 wavelength of light at said third port of said optical circulator.
- 1 4. An add multiplexer of claim 1, wherein said optical monitor measures both  
2 the optical power versus wavelength.
- 1 5. The add multiplexer of claim 1, wherein said optical monitor mechanism is  
2 coupled to said third port of said optical circulator and to said wavelength add  
3 mechanism, thereby providing a feedback path.

1 6. The add multiplexer of claim 1, further comprising a tunable source coupled  
2 to said wavelength add mechanism, said optical monitor mechanism is coupled to  
3 said third port of said optical circulator and to said tunable source, thereby  
4 providing a feedback path.

1 7. The add multiplexer of claim 1, wherein a drop mechanism is coupled in  
2 between said input port of the add multiplexer and said first port of said  
3 optical circulator.

1 8. An optical device for adding signals to an optical system having an input  
2 port and an output port, comprising:

3  
4 a first optical circulator comprising a first port, a second port and a third  
5 port, said first port of said first optical circulator coupled to said input port;

6  
7 an optical monitor device coupled to said third port of said first optical  
8 circulator;

9  
10 a filter coupled to said second port of said first optical circulator;

11  
12 a second optical circulator comprising a first port, a second port and a third  
13 port, said second port of said second optical circulator coupled to said filter;

14  
15 an add port coupled to said first port of said second optical circulator; and

16  
17 said third port of said second optical circulator being coupled to an output  
18 port.

9 The optical device of claim 8, further comprising a feedback path from said optical monitor device to said filter.

10. The optical device of claim 8, wherein said filter is tunable.

11. An add/drop multiplexer having an input port and an output port, comprising:

a wavelength drop mechanism coupled to said input port;

a wavelength add mechanism;

an optical circulator comprising a first port, a second port, and a third port, said first port of said optical circulator coupled to said wavelength drop mechanism and said second port of said optical circulator coupled to said wavelength add mechanism; and

said wavelength add mechanism being coupled to an output.

12. The add/drop multiplexer of claim 11, further comprising an optical monitor mechanism coupled between said optical circulator and said wavelength add mechanism, providing a feedback path to said wavelength add mechanism.

13. An add/drop multiplexer comprising:

an input port;

a first optical circulator comprising a first port, a second port and a third port, said first port coupled to said input port;

6

7 a first filter coupled to said second port of said first optical circulator;

8

9 a drop port coupled to said third port of said optical circulator;

10

11 a second optical circulator having a first port, a second port and a third port,

12 said first port of said second optical circulator coupled to said first filter;

13

14 a second filter coupled to said second port of said second optical circulator;

15

16 a third optical circulator having a first port, a second port and a third port,

17 said second port of said third optical circulator coupled to said second filter;

18

19 an add port coupled to said first port of said third optical circulator; and

20

21 an output port coupled to said third port of said third optical circulator.

1 14. The add/drop multiplexer of claim 13 wherein said said second filter is  
2 tunable.

1 15. The add/drop multiplexer of claim 13, further comprising a feedback loop  
2 from said third port of said second circulator to said second filter.

1 16. The add/drop multiplexer of claim 13, further comprising a tunable laser  
2 coupled to said add port.

1 17. The add/drop multiplexer of claim 16 further comprising a feedback loop  
2 from said third port of second circulator to said tunable laser, wherein said  
3 feedback loop controls the output wavelength of said tunable laser.

1 18. A method for controlling light propagation in an optical transmission  
2 system, comprising:  
3  
4 adding an optical signal to said optical transmission system using an optical  
5 add mechanism; and  
6  
7 detecting light propagation from said optical add mechanism using an  
8 optical circulator.

1 19. The method of claim 18, further comprising feeding back information  
2 related to the detected light propagation from said optical circulator to a tunable  
3 optical device.

1 20. A method for adding an optical signal to an optical transmission system,  
2 comprising:  
3

4 adding a first optical signal in a wavelength channel to said optical  
5 transmission system;  
6

7 detecting wavelength propagation responsive to adding said first optical  
8 signal using an optical circulator; and  
9

10 tuning a tunable optical device in response to detecting said wavelength  
11 propagation.

1 21. The method of claim 20, wherein said tunable optical device is a tunable  
2 filter.

1 22. The method of claim 20, wherein said tunable optical device is a tunable  
2 laser.

1 23. The method of claim 20, further comprising the step of feeding back  
2 information related to the detected light propagation from said optical circulator to  
3 said tunable optical device.

1 24. A method for dropping an optical signal from and adding an optical signal to  
2 an optical transmission system, comprising:

3  
4 receiving optical signals including a first optical signal within a first  
5 wavelength channel;

6  
7 dropping said first optical signal within a first wavelength channel out of  
8 said optical transmission system using a first tunable optical device;

9  
10 adding a second optical signal within a second wavelength channel to said  
11 optical transmission system using a second tunable optical device;

12  
13 detecting wavelength propagation responsive to adding said second optical  
14 signal using an optical circulator; and

15  
16 tuning said second tunable optical device in response to detecting said  
17 wavelength propagation.

1 25. The method of claim 24, wherein said detecting step further includes  
2 detecting wavelength propagation using a feedback path from said optical  
3 circulator to said second tunable optical device.

1 26. The method of claim 24, wherein said first optical signal and said second  
2 optical signal are the same wavelength.